

Notes For Forest Managers

Missouri Department of Conservation



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Thousand Cankers Disease of Black Walnut: How Much Will It Hurt Missouri's Pocketbook?

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Information Needs: MDC public contact personnel, industry and community leaders, and decision makers inside and outside of government need information on the possible impacts of thousand cankers disease on black walnut (*Juglans nigra*) and the Missouri economy. This information can help us understand the costs and benefits and best design of policies that may help slow or stop the spread of thousand cankers disease.

Thousand Cankers Disease

Since the 1990's an unusual decline of black walnut has been observed in Colorado and several other western states. Initial symptoms involve a yellowing and thinning of the upper crown, which progresses to include death of progressively larger branches. During the final stages large areas of foliage may rapidly wilt. Trees often are killed within three years after initial symptoms are noted. Tree mortality is the result of attack by the walnut twig beetle (*Pityophthorus juglandis*) and subsequent canker development around beetle galleries caused by a fungal (*Geosmithia* sp.) associated with the beetle. The name for this disease complex is thousand cankers disease (TCD).

Threat to Missouri

Thousand cankers disease is presently having devastating effects on black walnut in many western states. However, in most states the effects are on plantings made by humans. Most areas where damage by TCD has occurred are sites where black walnut is not native. This serious situation could become catastrophic if infective walnut twig beetles were allowed to colonize areas such as Missouri where black walnut grows as a native tree. Based on the patterns seen in the west, such a colonization could very possibly develop into an uncontrollable outbreak. This may ultimately have the potential to destroy black walnut in its native range in a manner previously demonstrated by introduced species such the emerald ash borer and pathogens that produce Dutch elm disease and chestnut.

Disease Controls

Controls for TCD have not yet been identified and their development will require better understanding of the biology of the walnut twig beetle and the fungus. Because of the extended period when adult beetles are active, insecticide spray applications will likely have limited effectiveness. Furthermore, colonization of the bark and cambium by the fungus may continue even if adult beetles or larvae are killed by the insecticide. This will likely limit the ability of systemic insecticides to control transmission of the fungus to new hosts

before substantial infection occurs. Rapid detection and removal of infected trees currently remains the primary means of managing thousand cankers disease. Stopping or slowing its spread from infested areas relies on quarantines of wood products and public education.

Economic Impacts

Using existing data from Forest Inventory and Analysis plots, Timber Product Output surveys, Timber Price Trend reports and the most recent street tree inventories, we can estimate the potential economic cost of TCD in Missouri. The economic impacts of TCD come in three flavors, the loss to the wood products industry as trees die, the loss to the nut industry, and the loss to communities as street trees die.

The annual impact to the wood products industry includes foregone payments to landowners and loggers, and the lost value added at the sawmill. In addition, these losses will lead to further effects throughout the economy, as landowners, loggers and mill operators have that much less to spend on other items. (This “indirect” effect was calculated using IMPLAN software, data and models.) These are annual losses that the Missouri economy would forgo every year into the future. In addition to the annual losses shown below, the IMPLAN model estimates that 210 jobs would be lost.

Statewide Wood Products Loss		
Volume	1,310,078	BF (veneer) ¹
	10,613,371	BF (sawlogs) ¹
Landowners	\$2,528,451	\$1.93/BF (veneer) ²
	\$7,164,025	\$0.68/BF (sawlogs) ²
Loggers	\$1,310,078	\$1.00/BF (veneer) ³
	\$6,368,023	\$0.60/BF (sawlogs) ³
Mills	\$877,752	\$0.67/BF (veneer) ³
	\$4,245,348	\$0.40/BF (sawlogs) ³
Total Direct Impact	\$22,493,677	
Indirect Impact⁴	\$13,840,000	
Total	\$36,333,677	annual value

The annual impact to the nut industry includes foregone payments to nut gatherers, and the lost value added at processor. Again, these losses will lead to further effects throughout the economy and are annual losses that the Missouri economy would forgo every year into the future. In addition to the annual losses shown below, the model estimates that 504 jobs would be lost in the nut industry and the other sectors it affects.

Statewide Nut Production Loss		
	Low	High
Harvester⁵	\$ 4,300,000	\$ 6,500,000
Producer⁵	\$13,900,000	\$21,000,000
Total Direct Impact	\$18,200,000	\$27,500,000
Indirect Impact⁴	\$ 9,909,000	\$14,974,000
Total	\$28,109,000	\$42,474,000
Avg. Total Value	\$35,291,500	

¹ Harvest volumes from Missouri’s 2006 Timber Product Output survey (Treiman and Piva, 2007).

² Timber prices from Missouri Timber Price Trends (Tuttle and Treiman, 2009).

³ Value added by loggers and mills personal communication with the authors (John Tuttle, MDC Forest Products specialist, 2009).

⁴ Estimated using the IMPLAN model.

⁵ Personal communication with the authors (University of Missouri Extension, 2009).

Losses from affected street trees include the cost of removing the tree, its “landscape value” and the cost of replacing it. Landscape value is a catchall term that includes everything from a tree’s aesthetic value to its impact on property values and cooling costs. MDC does not collect data on landscape value as part of its street tree surveys, but Midwestern values are available, for example from Ohio’s Emerald Ash Borer economic study. Losses from affected street trees are not annual, but rather a one-time phenomena, although spread out over many years. Note that these numbers do not include private and park trees.

Statewide Urban Street Tree Loss		
Number of Black Walnut trees⁶	39,561	
Removal Costs⁷	\$4,916,121	\$375-\$1,290/tree
Landscape Value⁷	\$49,253,272	\$1,245/tree
Replacement Cost⁷	\$11,472,650	\$290/tree
Total	\$65,642,043	

To determine the total impact, we need to combine the annual industry losses with the “one-time” community losses. Little is known about the spread of TCD and it is impossible to estimate if or when it will arrive in Missouri. (Indeed, since TCD symptoms may be invisible for several years, TCD may already be in Missouri.) Assuming that TCD arrives next year and that the losses are spread out over 20 years, we can do this by determining the net present value (NPV) of each. NPV translates future dollars into today’s dollars, given the discount rate. One way of thinking about NPV is to imagine paying for future losses by putting some money in the bank today. For example, putting \$100 in the bank today at a 4% interest rate could pay for a \$104 in damages next year.

Year	Wood Products	Nuts	Community Trees	Total (in future dollars)	NPV
2010	\$1,816,684	\$1,764,575	\$3,282,102	\$6,863,361	\$6,599,386
2011	\$3,633,368	\$3,529,150	\$3,282,102	\$10,444,620	\$9,656,638
2012	\$5,450,052	\$5,293,725	\$3,282,102	\$14,025,879	\$12,468,955
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2028	\$34,516,993	\$33,526,925	\$3,282,102	\$71,326,020	\$33,854,355
2029	\$36,333,677	\$35,291,500	\$3,282,102	\$74,907,279	\$34,186,704
Total (during spread)					\$492,817,334
Year 2030 on (total)	\$36,333,677	\$35,291,500	\$0	\$71,625,177	\$358,623,551
Total					\$851,440,886

Under these assumptions, the statewide effect of TCD is over \$850 million dollars. Obviously the result changes with the discount rate (for example, the total losses go up if the discount rate goes down to the current Federal Funds rate target of 0.25%), if Missouri has significantly different community values than Ohio, or if Missouri can delay, or even stop, the spread of TCD – losses farther in the future are worth less today.

Clearly, Missouri has a lot to gain by keeping TCD out of the area!

⁶ From MDC’s street tree survey (Gartner et al., 2002).

⁷ Ohio’s removal, replacement and landscape values (Snydor et al., 2007).

Keywords: thousand cankers disease, forest products, community forestry, economic impacts.

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